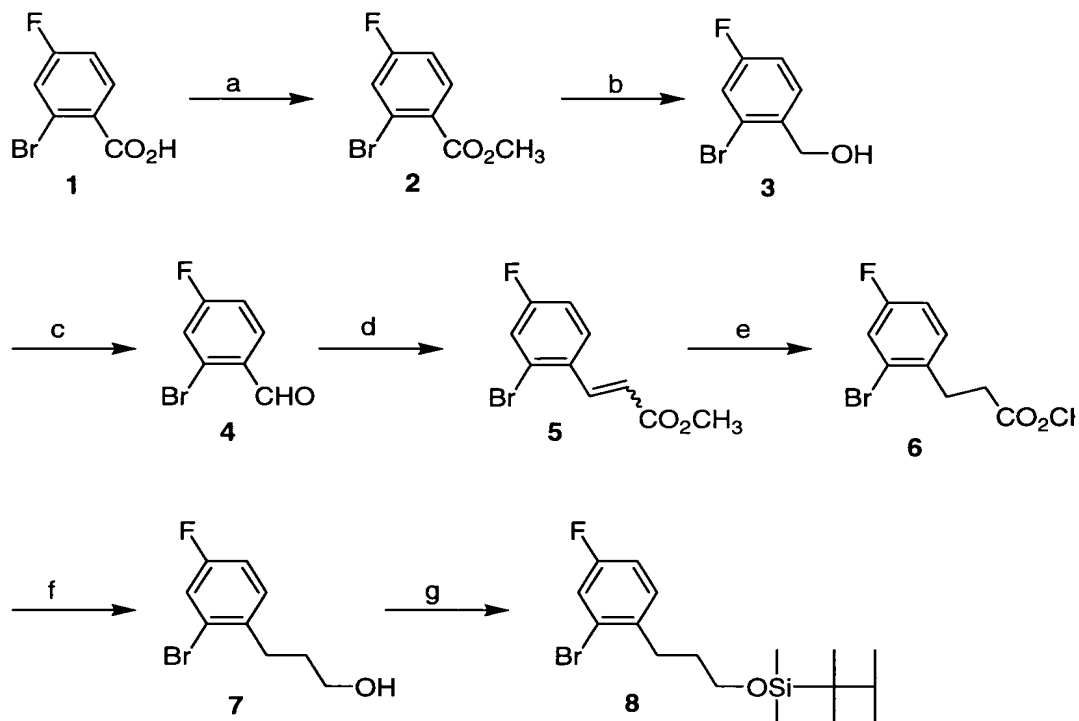
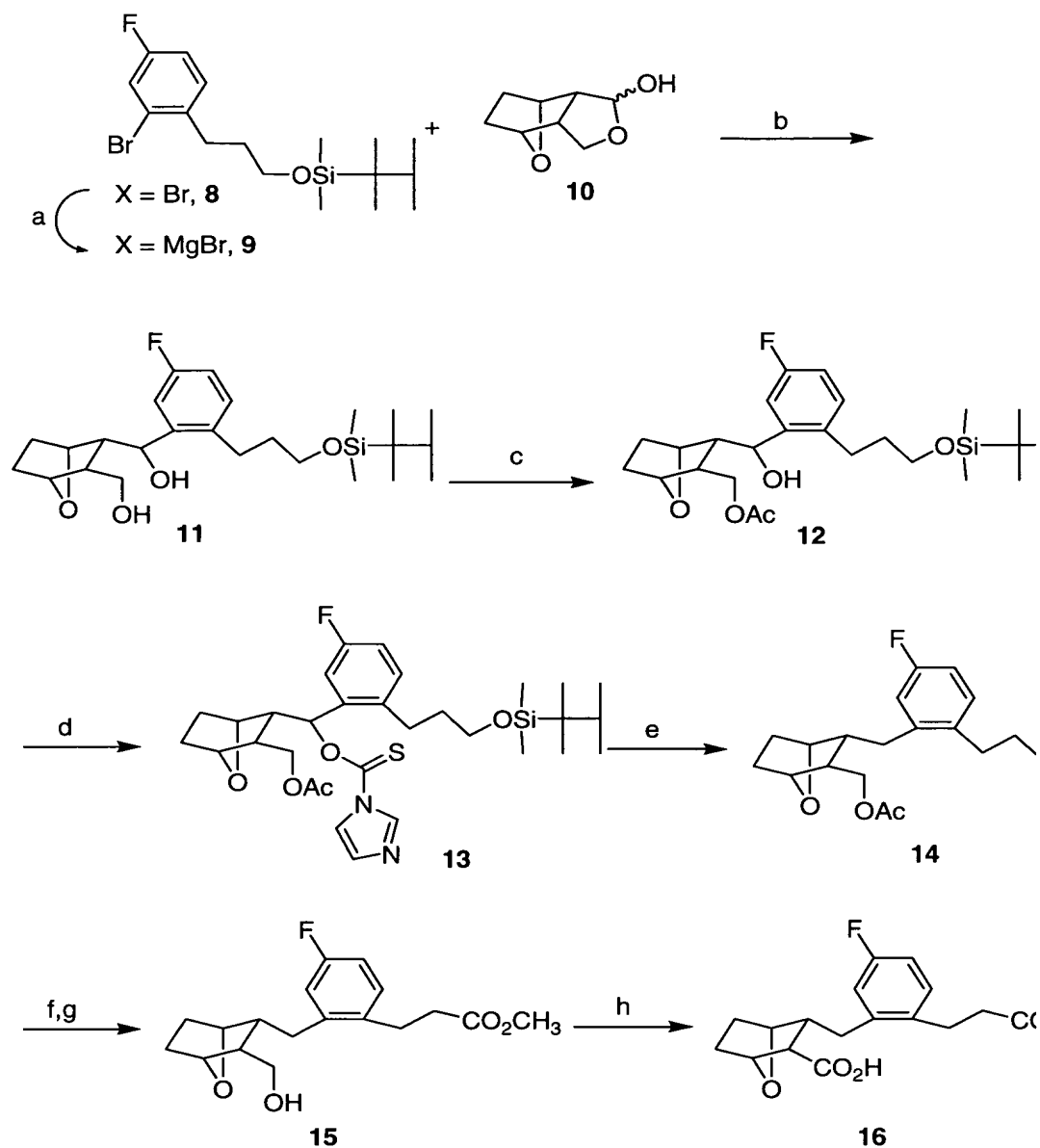


FIGURE 1



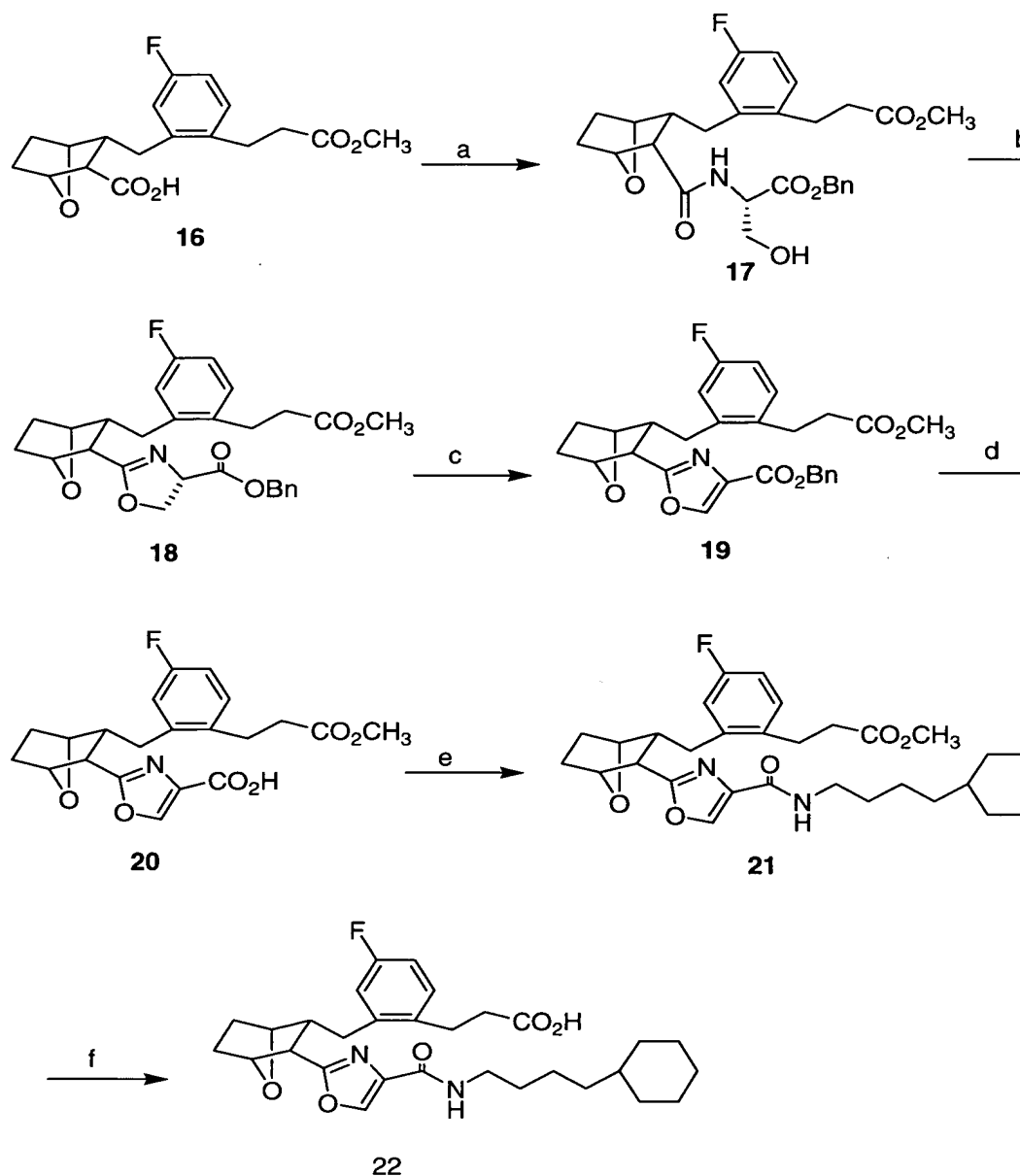
(a)  $\text{CH}_3\text{I}$ , DBU, acetone; (b) DIBAL, toluene  $-78^\circ\text{C}$  to rt; (c) PDC,  $\text{MgSO}_4$ , 4Å molecular sieves,  $\text{CH}_2\text{Cl}_2$  74% from 1; (d)  $\text{Ph}_3\text{PCHCO}_2\text{CH}_3$ , toluene 95%; (e)  $(\text{Ph}_3\text{P})_3\text{RhCl}$ ,  $\text{H}_2$ , EtOH 80%; (f) DIBAL, toluene  $-78^\circ\text{C}$  to rt 99%; (g) Dimethylhexylsilyl chloride, DMAP,  $\text{Et}_3\text{N}$ ,  $\text{CH}_2\text{Cl}_2$  83%.

FIGURE 2



(a) Mg, THF, 65 °C; (b) EtMgBr, 0 °C to rt 69%; (c)  $\text{Ac}_2\text{O}$ , pyridine 77%; (d)  $(\text{Im})_2\text{S}$ ,  $\text{ClCH}_2\text{CH}_2\text{Cl}$ , 60 °C 94%; (e)  $n\text{-Bu}_3\text{SnH}$ , AIBN, toluene, 110 °C 84%; (f)  $\text{CrO}_3$ ,  $\text{H}_2\text{SO}_4$ , acetone; (g) MeOH, AcCl 88% for 2 steps; (h)  $\text{CrO}_3$ ,  $\text{H}_2\text{SO}_4$ , acetone.

FIGURE 3



(a) L-serine benzyl ester hydrochloride, DCC, HOBT, Et<sub>3</sub>N, THF 80% for 2 steps; (b) PPh<sub>3</sub>, CCl<sub>4</sub>, tPr<sub>2</sub>NEt, CH<sub>3</sub>CN 69%; (c) BrCCl<sub>3</sub>, DBU, CH<sub>2</sub>Cl<sub>2</sub> 0 °C 75%; (d) H<sub>2</sub>, Pd(OAc)<sub>2</sub> 100%; (e) i. (COCl)<sub>2</sub>, cat. DMF, CH<sub>2</sub>Cl<sub>2</sub>; ii. 4-cyclohexylbutylammonium chloride, Et<sub>3</sub>N, CH<sub>2</sub>Cl<sub>2</sub> 78%; (f) NaOH, aqueous THF, 95%.

**FIGURE 4**